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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/659,044	09/09/2003	Sarah E. Kim	Intel 10559-857001 / P173	3270
20985	7590	12/09/2004	EXAMINER	
FISH & RICHARDSON, PC 12390 EL CAMINO REAL SAN DIEGO, CA 92130-2081			LE, THAO X	
			ART UNIT	PAPER NUMBER
			2814	

DATE MAILED: 12/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

2X

Office Action Summary	Application No. 10/659,044	Applicant(s) KIM ET AL.	
	Examiner Thao X Le	Art Unit 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 November 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) 13-18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09/09/03 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>09/09/03</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Claims 13-28 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected claims, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 11/18/04.

Drawings

2. Figure 1A, 1B and 1C should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an

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international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 4-5, 7-9 are rejected under 35 U.S.C. 102(e) as being anticipated by US 6673698 to Lin et al.

Regarding claim 1, Lin discloses an apparatus in fig. 1J comprising: first and second bumps 28, column 3 line 45, a first metal layer 18, column 3 line 19, coupled to the first and second bumps 28, the first metal layer being formed in a trench of a dielectric layer 16, column 3 line 15, the first metal layer 18 being coupled to a top metal layer, column 3 line 17, (the layer in contact with IC 12, fig. 1a) of an integrated circuit die 12, column 3 line 7, the first metal layer being 18 adapted to transfer current from the first and second bumps 28 to the top metal layer of the integrated circuit die.

Regarding claims 4-5, Lin discloses the apparatus wherein the first metal layer 18 is about 1 to 150 microns thick, column 3 line 27, wherein the first metal layer comprises electroplated copper, column 3 line 25.

The process limitations “electroplated” in claim 5 do not carry weight in a claim drawn to structure. In re Thorpe, 277 USPQ 964 (Fed. Cir. 1985).

Regarding claims 7-9, Lin discloses the apparatus of further comprising a first dielectric layer 20, column 3 line 28, enclosing the first metal layer 18, fig. 1e, wherein the first dielectric layer 20 comprises a self-planarizing, photo-definable polymer, column 3 line 28.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 2-3, and 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6673698 to Lin et al. in view of Applicant Admitted Prior Art (APA).

Regarding claim 2, Lin does not disclose the apparatus of Claim 1, wherein the first and second bumps are Controlled Collapse Chip Connection (C4) bumps.

However, APA discloses structure where the solder bumps 12 are connected to C4 bumps 112, fig. 1A. Thus; at the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the teaching of APA with Lin's device for intended used, MPEP 2144.07.

Regarding claim 3, Lin does not disclose the apparatus wherein the first and second bumps are coupled to first and second solder bumps of a substrate.

However, APA discloses the first and second C4 bumps (112B) are coupled to first and second bumps (130B) of a substrate 128, fig. 1C. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the teaching of APA with Lin's

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device, because such C4 connection is typical in the art as disclosed by APA, specification page 1 [0001].

Regarding claims 10-11, Lin discloses the apparatus further comprising a second metal layer 24, column 3 line 34 over the first metal layer 18, the second metal layer 24 being coupled to the first bump 28 and the first metal layer 18, the second metal layer being adapted to transfer current from the first and third bumps to the first metal layer 18, which is adapted to transfer current to the top metal layer (contact metal in contact with die 12) of the integrated circuit die 12, wherein the second metal layer 24 is orthogonal to the first metal layer 18, fig. 1J.

But, Lin does not disclose the second metal is being coupled with the third bump.

As discuss in the above claim 3, it would have been obvious that the second metal layer would have coupled with a third bump of the substrate in the C4 connection structure as discloses by APA.

8. Claims 6 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6673698 to Lin et al. in view of US 5950102 to Lee.

Regarding claims 6 and 12, Lin discloses the apparatus wherein the first metal layer 18 is deposited in vias, fig. 1c,

But Lin does not disclose the first metal layer is deposited over the first base layer metallization, which is deposited over the top metal layer of the integrated circuit die, and wherein the apparatus further comprising diffusion barriers over and on the side of the first metal layer.

However, Lee discloses the apparatus in fig. 7 wherein the first metal layer 32, column 5 line 44, is deposited in vias, over the first base layer metallization 30, column 6

line 40, which is deposited over the top metal layer 26, column 6 line 5, of the integrated circuit die and wherein the apparatus further comprising diffusion barriers 30 and 38, column 6 line 35 over and on the side of the first metal layer 32. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the base layer metallization and diffusion barrier layer teaching of Lee with Lin's device, because theses layer would serve as diffusion barrier and improve the bonding strength between the metal layers as taught by Lee, column 5 lines 42-43.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao X Le whose telephone number is (571) 272-1708. The examiner can normally be reached on M-F from 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M Fahmy can be reached on (571) 272 -1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Thao X. Le
06 Dec. 2004

A handwritten signature in black ink, appearing to read 'Hoai Pham', with a stylized, cursive script.

**HOAI PHAM
PRIMARY EXAMINER**